

# Electronic Nicotine Delivery Systems (ENDS)

## Science, Policy, and Communication

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**Community Health Promotion Summit**

**January 28, 2016 • Hutchinson, Kansas**



# Overview

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What are Electronic  
Nicotine Delivery  
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Who is Using  
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What are some  
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1

What are Electronic  
Nicotine Delivery  
Systems (ENDS)?

# Electronic Nicotine Delivery Systems (ENDS)



**E-Cigarettes**



**Hookah Pens**

**E-Cigars**



**Vape Pens**



**E-Pipes**



**E-Hookahs**



**At least 450 Brands**

# Types of ENDS Products



MINI E-CIG



MID-SIZED



MODIFIED



Smaller/Fixed

Larger/Customizable

# Anatomy of an E-Cigarette



**User inhales aerosol**

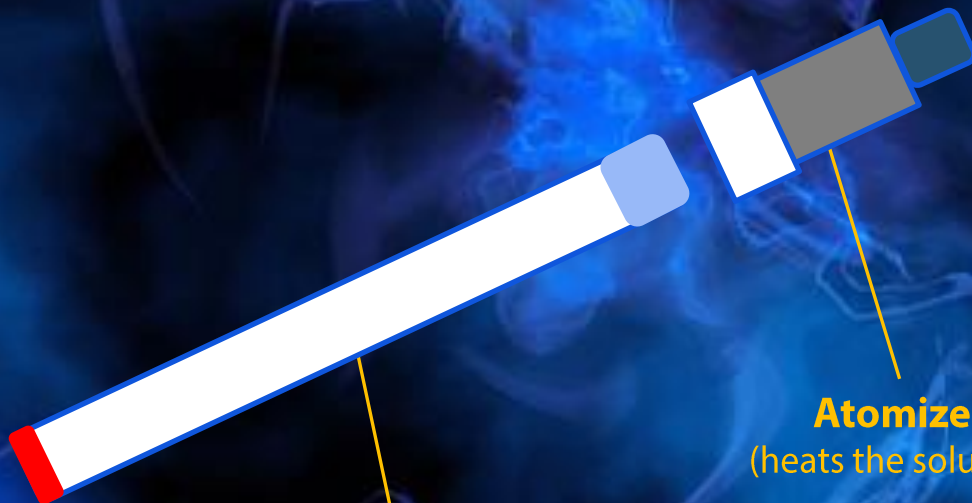


**Liquid Cartridge**

(holds a liquid nicotine, propylene glycol, and/or glycerin solution)

**Atomizer**  
(heats the solution)

**Battery**  
(power source)



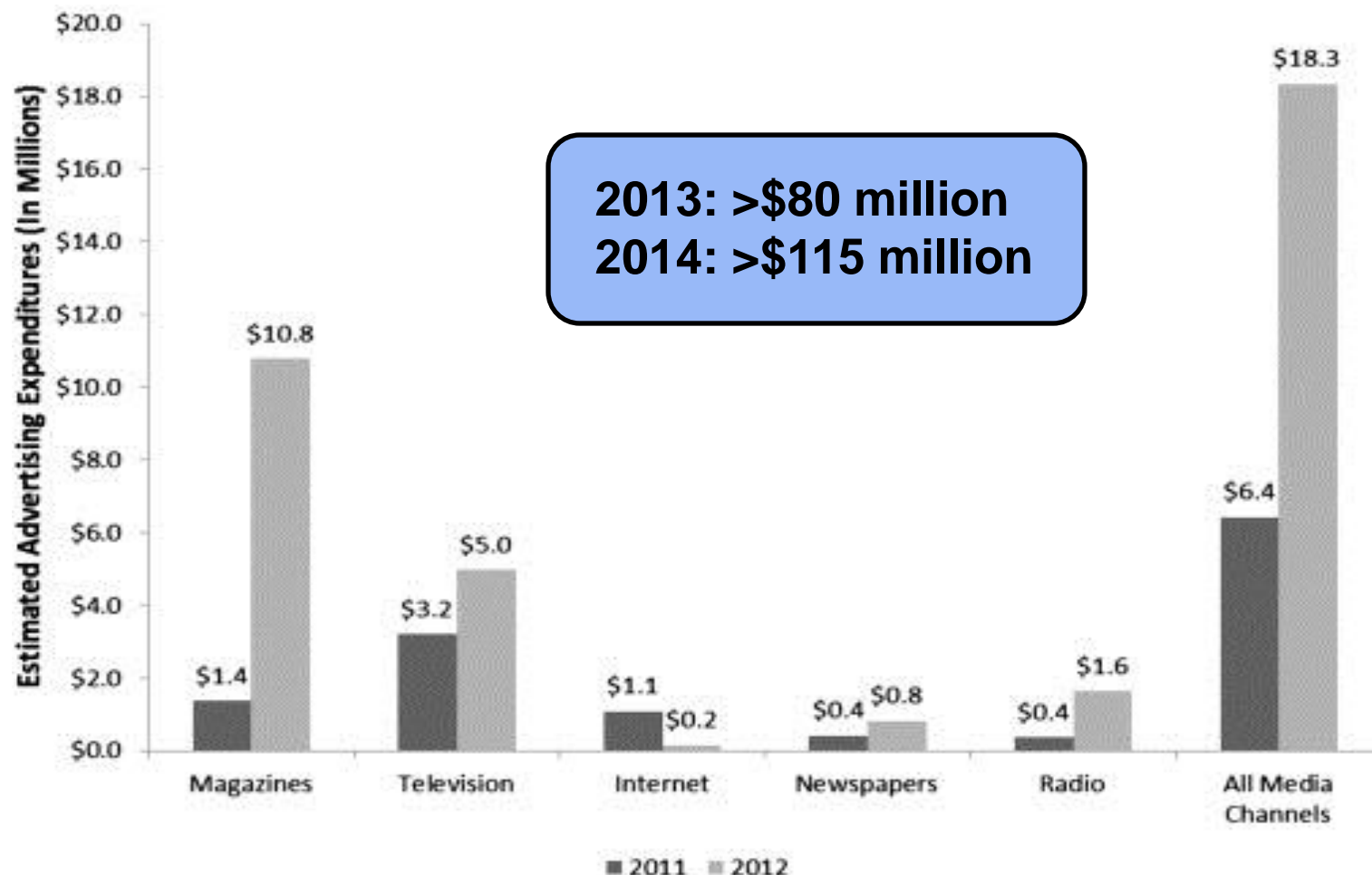


# Emissions from ENDS



**Mainstream  
(Exhaled) Aerosol**

## E-cigarette Advertising Expenditures, by Media Channel, 2011–2012





# Marked Increases in the Sale of ENDS (2012-2013)

- **In convenience stores, dollar sales increased:**

- 320.8% for disposable e-cigarettes
- 72.4% for starter kits
- 82% for cartridges



- **In food, drug, and mass merchandisers, dollar sales increased:**

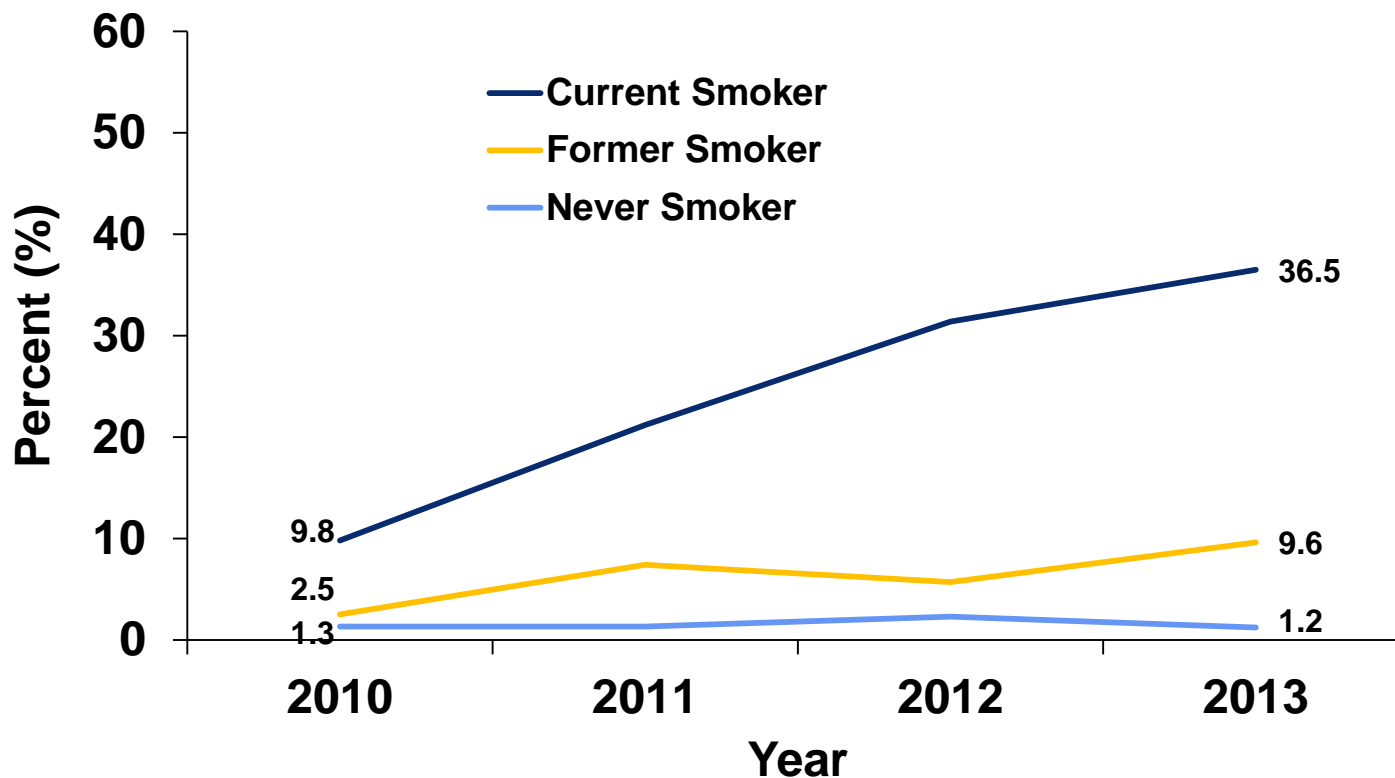
- 49.5% for disposable e-cigarettes
- 89.4% for starter kits
- 126.2% for cartridges



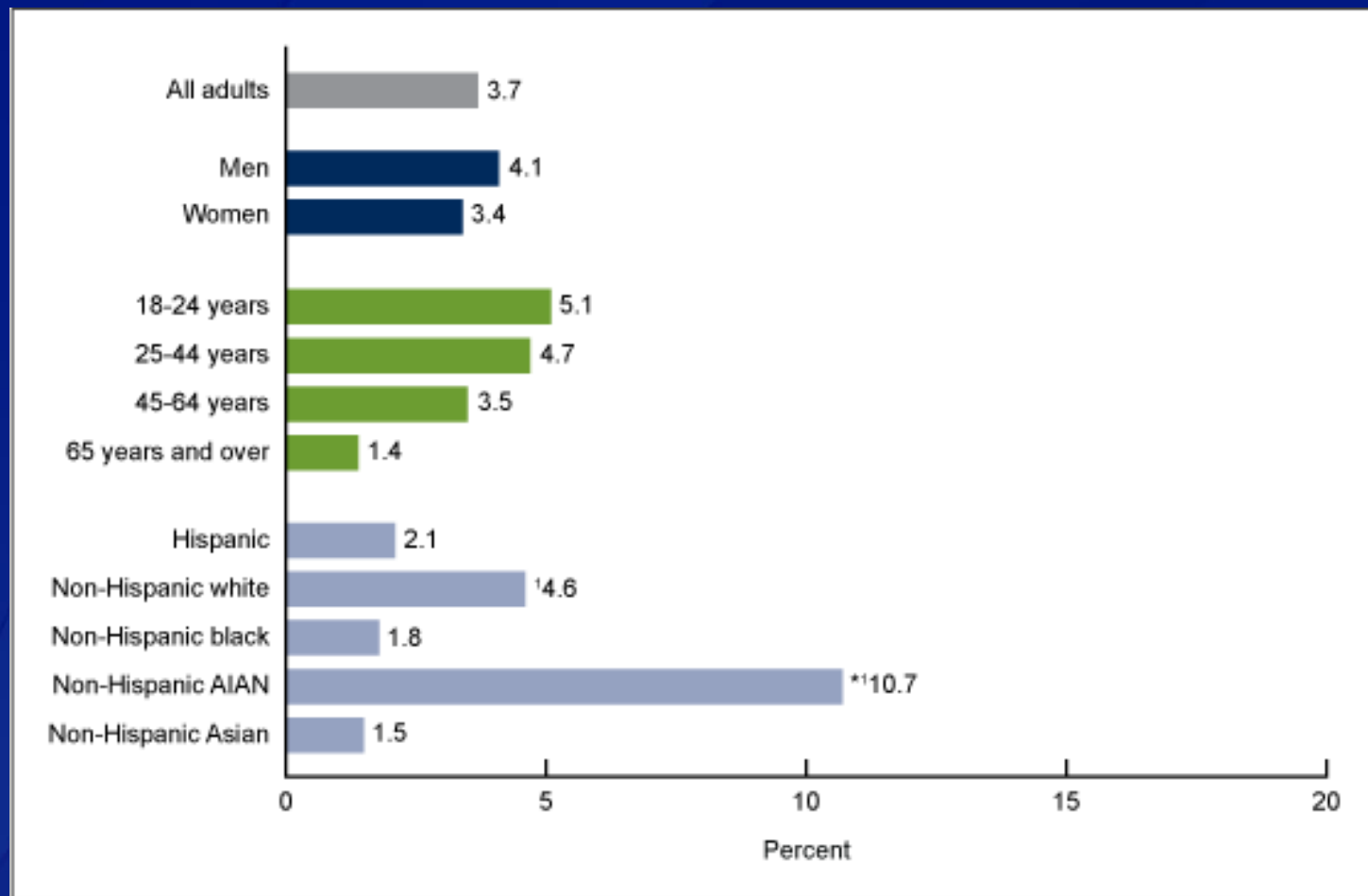
**2**

**Who is Using  
ENDS?**

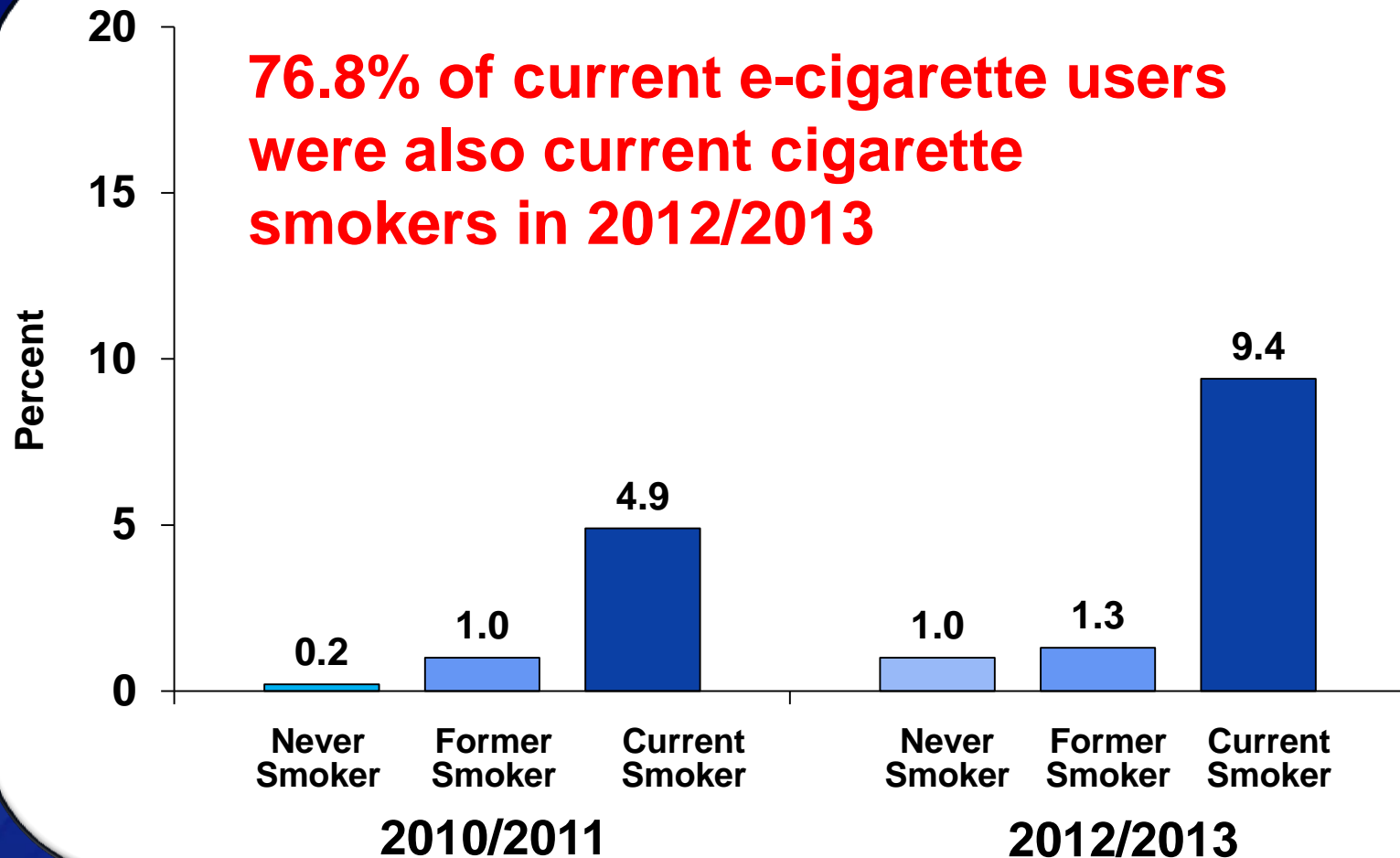
## Ever Use of E-cigarettes among U.S. Adults, by Cigarette Smoking Status, Styles, 2010-2013



# Percentage of U.S. adults who currently use e-cigarettes, by sex, age, and race/ethnicity, 2014



## Past 30 day use of e-cigarettes among U.S. adults, by cigarette smoking status – Styles, 2010/2011 & 2012/2013



# “Cutting Back” is Not Enough

## Risks for Dual Users of Cigarettes and E-Cigs

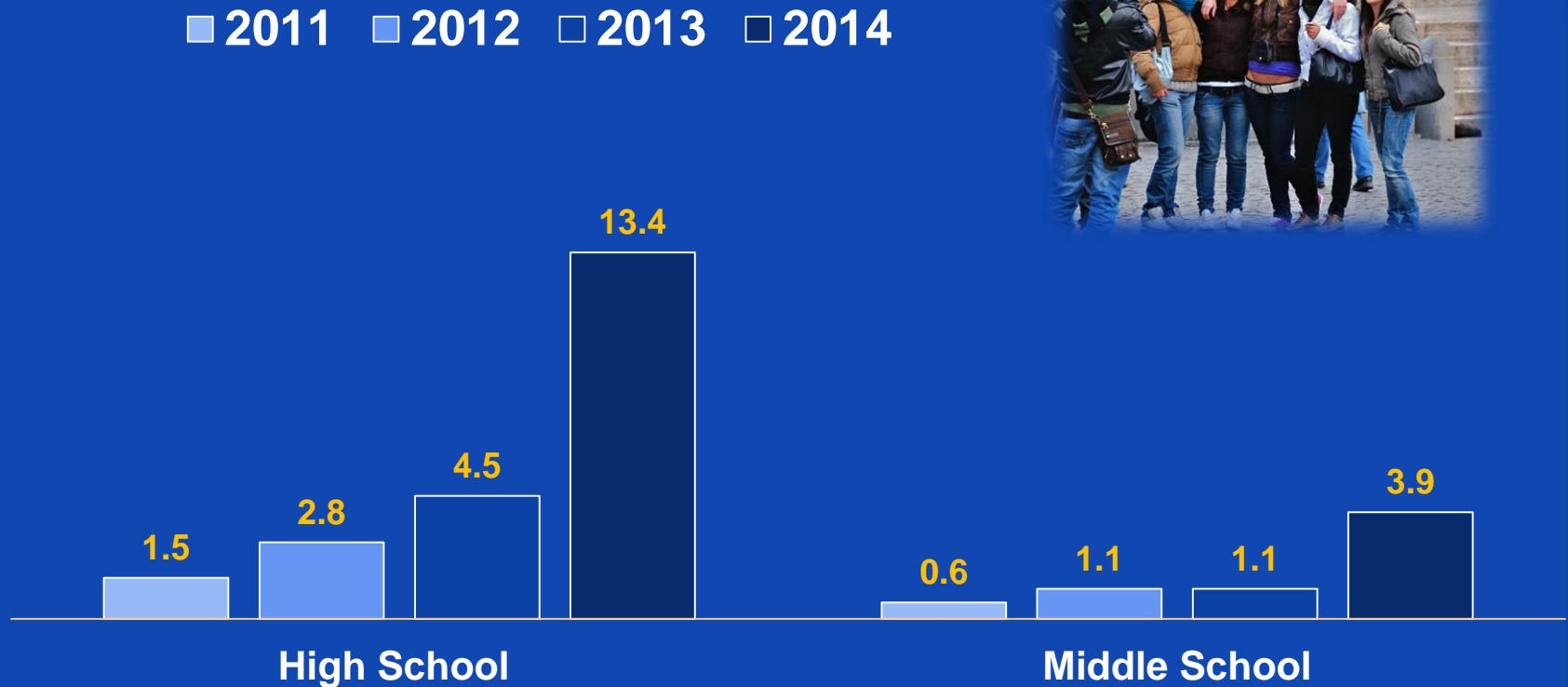
- Smoking just 1-4 cigarettes per day doubles risk of dying from heart disease
- Heavy smokers who reduce cigarette use by half still have very high risk for early death

## Benefits of Completely Quitting

- Heart disease risk cut in half 1 year after quitting
- This risk continues to drop over time
- Quitting at age 50 cuts your risk in half for early death from a smoking-related disease



# Current (Past 30 Day) Use of E-cigarettes among U.S. Middle and High School Students, 2011-2014




# E-cigarettes and Nonsmoking Youth

- From 2011-2013, the number of “never smoking” youth who used an e-cigarette increased three-fold.
- The intention to smoke conventional cigarettes was also higher among e-cigarette users.

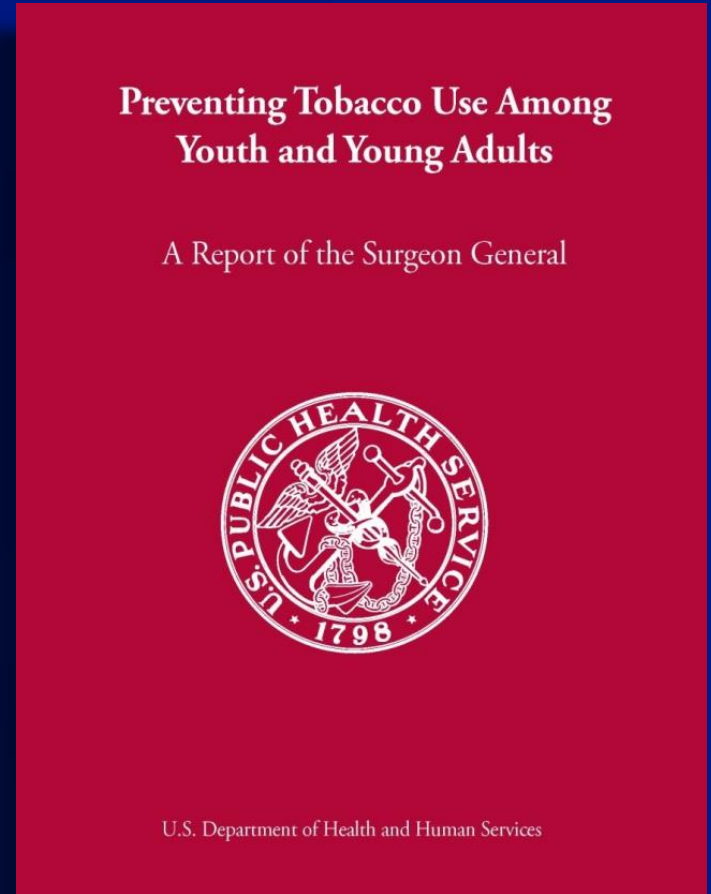


## Among Youth, E-cigarette Use May Lead to Conventional Cigarette Use

- High school students who had never smoked but reported ever using e-cigarettes at baseline were 2.7 times more likely to start using combustible tobacco after 1 year compared with high school students who never used e-cigarettes
- 
- U.S. adolescents and young adults who had never smoked but used e-cigarettes at baseline were 8.3 times more likely to progress to cigarette smoking after 1 year than nonusers of e-cigarettes

# What Factors Lead to Youth Smoking?

- Exposure to ads
- Youth-resonating themes
- Low prices/price promotions
- Ease of access
- Youth-appealing flavors
- Health claims
- Ease of product use



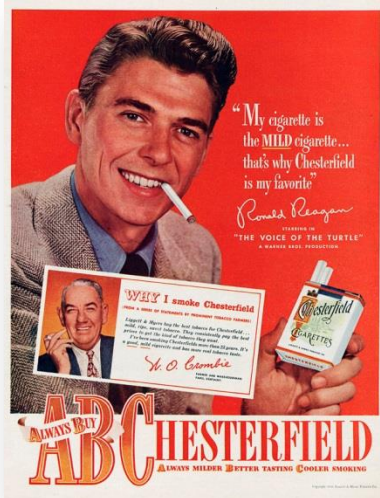
**Among  
U.S. middle and high school  
students who  
currently use e-cigarettes,  
63% have used  
flavored e-cigarettes  
(1.58 million U.S. youth)**





# ENDS Marketing Uses Traditional Tactics

1940's / 1950's



2010's





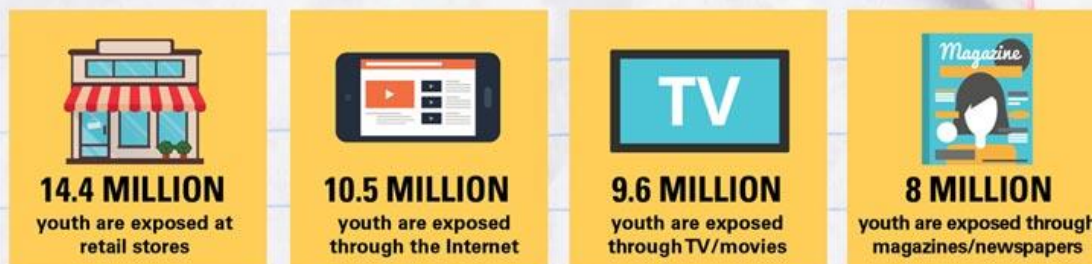
# ENDS Advertising Via Television



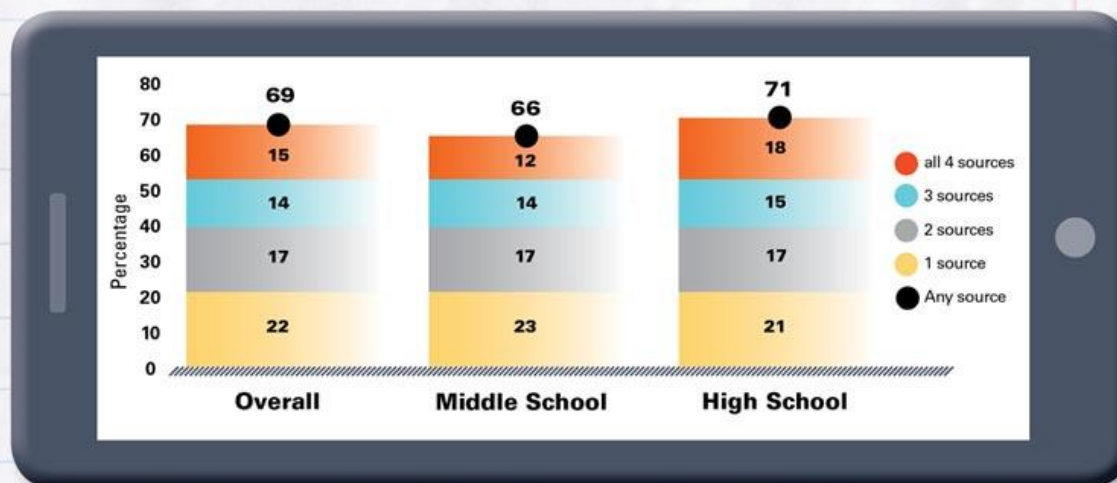
Source: Philip Morris USA; Blu Ecigs

## Youth are exposed to e-cigarette advertisements from multiple sources.

### Sources of e-cigarette advertisement exposure



### US students exposed to e-cigarette advertisements, by school type and number of sources of exposure



\* Percentages may not add up exactly to any source due to rounding.

SOURCE: National Youth Tobacco Survey 2014.

# Marketing ENDS to Treat Psychiatric Symptoms



The screenshot shows the Smokeless Delite website. At the top, the logo "SMOKELESS DELITE" is displayed in white and red text on a black background. To the right of the logo is a red cart icon with the text "CART 0 items - \$0.00". Below the logo is a navigation bar with links: HOME, STARTER KITS, ATOMIZER TANKS, BATTERIES, VARIABLE VOLTAGE DEVICES, E-LIQUID, and ACCESSORIES. The main content area features a sidebar on the left with a "Products" section containing links to "Elation Starter Kit", "Joy Starter Kit", "Pleasure Starter Kit", "EGO-T Starter Kits", and "Deluxe Kit". Below this is a "Variable Voltage & Mechanical" section with links to "Variable Voltage Devices" and "EGO Batteries". The main article is titled "Electronic Cigarettes May Reduce Depression" and includes a sub-header "Depression Can Get The Better Of You Without These Tips". The article text discusses the benefits of electronic cigarettes for depression, mentioning that they can help with symptoms like insomnia and headaches, and that they block serotonin production. It concludes by recommending electronic cigarettes that may reduce depression.

**SMOKELESS DELITE**

CART 0 items - \$0.00

HOME STARTER KITS ATOMIZER TANKS BATTERIES VARIABLE VOLTAGE DEVICES E-LIQUID ACCESSORIES

**Products**

- Elation Starter Kit
- Joy Starter Kit
- Pleasure Starter Kit
- EGO-T Starter Kits
- Deluxe Kit

**Variable Voltage & Mechanical**

- Variable Voltage Devices
- EGO Batteries

## Electronic Cigarettes May Reduce Depression

### Depression Can Get The Better Of You Without These Tips

### Electronic Cigarettes May Reduce Depression

As you begin treating your depression with electronic cigarettes, you should know what to expect. Before you can start treatment, you need to find out what is available, and where you can find the answers you need. The tips below can help you with how to start.

If you find yourself struggling with depression, try to eliminate your consumption of diet sodas or any other food or drink that has a sugar substitute. Artificial sweeteners can cause insomnia and headaches, which are two things that depression itself causes. In addition, they block serotonin from being produced. Avoid these products completely and try Electronic Cigarettes that May Reduce Depression .

**3**

**What are the  
Health Effects of  
ENDS?**



# **“The century-long epidemic of cigarette smoking has caused an enormous avoidable public health tragedy”**



**1964**

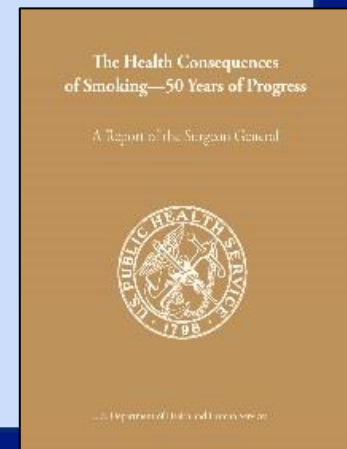


**2014**

# Significant Questions Remain About:

- 1) How to assess the potential toxicity and health effects of the more than 250 electronic cigarettes brands;
- 2) The magnitude of the potential reduced risk from electronic cigarettes versus continuing use of conventional cigarettes for individual smokers;
- 3) The need to weigh the potential individual benefits and risks versus population benefits and risks;
- 4) How the advertising and marketing of these new products should be regulated and;
- 5) Even assuming that electronic cigarettes could be sufficiently safe to users and offer net public health benefits, there are significant questions about the manner in which they should be regulated.”

*Chapter 16, page 873*





# 2014 Surgeon General's Report: ENDS

- ❑ **Could have negative and positive individual and population health impact**

“This shift in patterns of tobacco use could have a number of potential impacts, ranging from the positive effect of accelerating the rate at which smokers quit smoking cigarettes completely to a negative effect of slowing down the decrease in the use of all tobacco products, especially cigarettes”



Chapter 15, Page 859

# ENDS Potential for Harm if:



Leads to initiation of combustible tobacco use among non-smokers, particularly children



Leads to relapse among former smokers



Diminishes the chances that a smoker will quit



Discourages smokers from using proven quit methods



Exposes children, pregnant women, and non-users to secondhand aerosol



Glamorizes or renormalizes tobacco use



Results in poisonings among users or non-users



# Harmful and Potentially Harmful Ingredients in ENDS Aerosol



# Nicotine Poses Unique Dangers to the Developing Human

Nicotine is toxic to developing fetuses and impairs fetal brain and lung development

Poisonings occur among users via ingestion of nicotine liquid, absorption through skin, and inhalation

Nicotine use while adolescent brain is developing can disrupt brain circuit formation



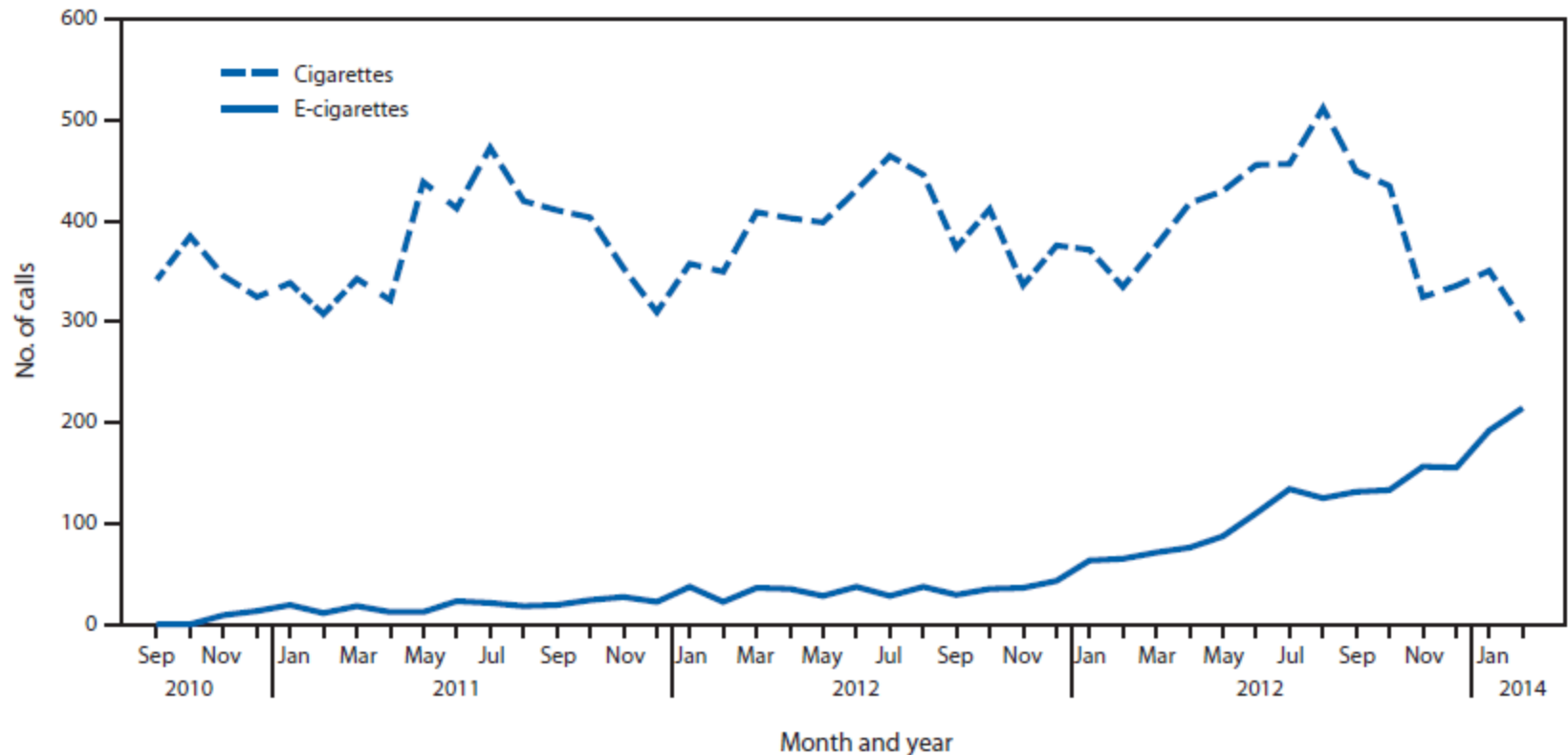


# ENDS can be Modified to Accommodate Other Psychoactive Substances

"I was on the train from New York to Baltimore and I enjoyed the pen the whole way there and back with no one noticing," said one life-long marijuana user who asked not to be identified. "I absolutely was thinking 'This is not bad at all.'"



## Number of calls to poison centers for cigarette or e-cigarette exposures, by month – U.S., September 2010–February 2014



**Source:** Centers for Disease Control and Prevention. *Notes from the Field: Calls to Poison Centers for Exposures to Electronic Cigarettes — United States, September 2010–February 2014. Morbidity & Mortality Weekly Report.* 2014;63:292-293.



Is there a potential benefit for ENDS?

Only under certain circumstances



Complete long term substitution by established smokers



Assist in rapid transition to a society with little or no use of combustible products



Short-term use if shown to produce successful and permanent cessation of combustible products

**4**

**What are Some  
ENDS Policy  
Options?**

# Changing the Cost-Benefit Calculus

**Individual**



Tobacco  
Addiction

- Tobacco easily accessible
- Smoking in public legal
- Unfettered advertising
- Poor access to cessation help
- Cigarettes designed to addict

**Society**

# Changing the Cost-Benefit Calculus

**Individual**



Tobacco  
Addiction

- Tobacco more expensive and less accessible
- Smoke-free policies
- Counter-marketing and promotion restrictions
- Easy access to help
- Cigarettes made less addictive

**Society**

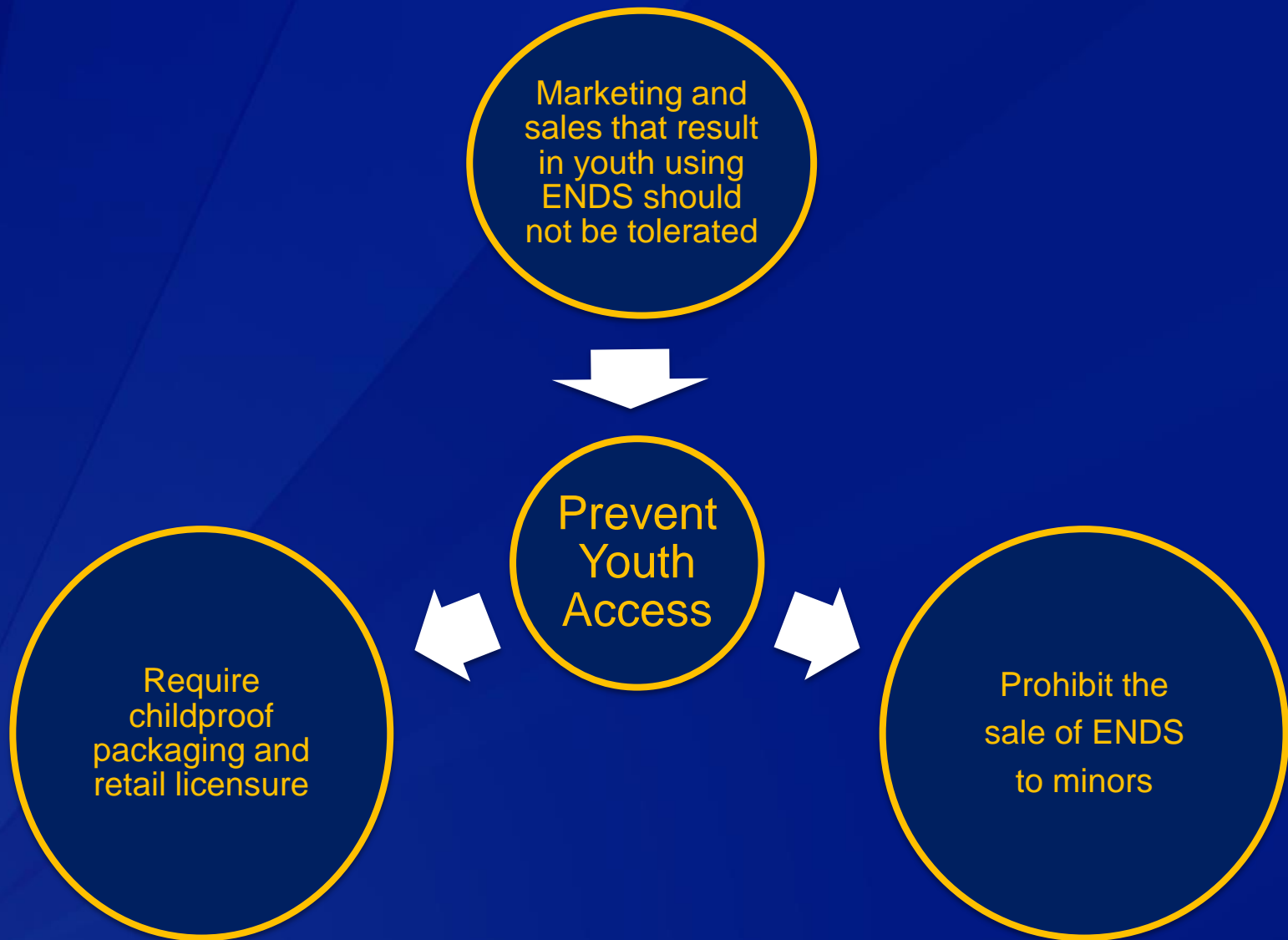
# Family Smoking Prevention and Tobacco Control Act

- Signed into law on June 22, 2009
- Granted FDA the authority to regulate tobacco products
- Enhances the ability to intensify policy to reduce tobacco industry influence
  - Manufacturing
  - Marketing
  - Sale



Photo: AFP/GETTY

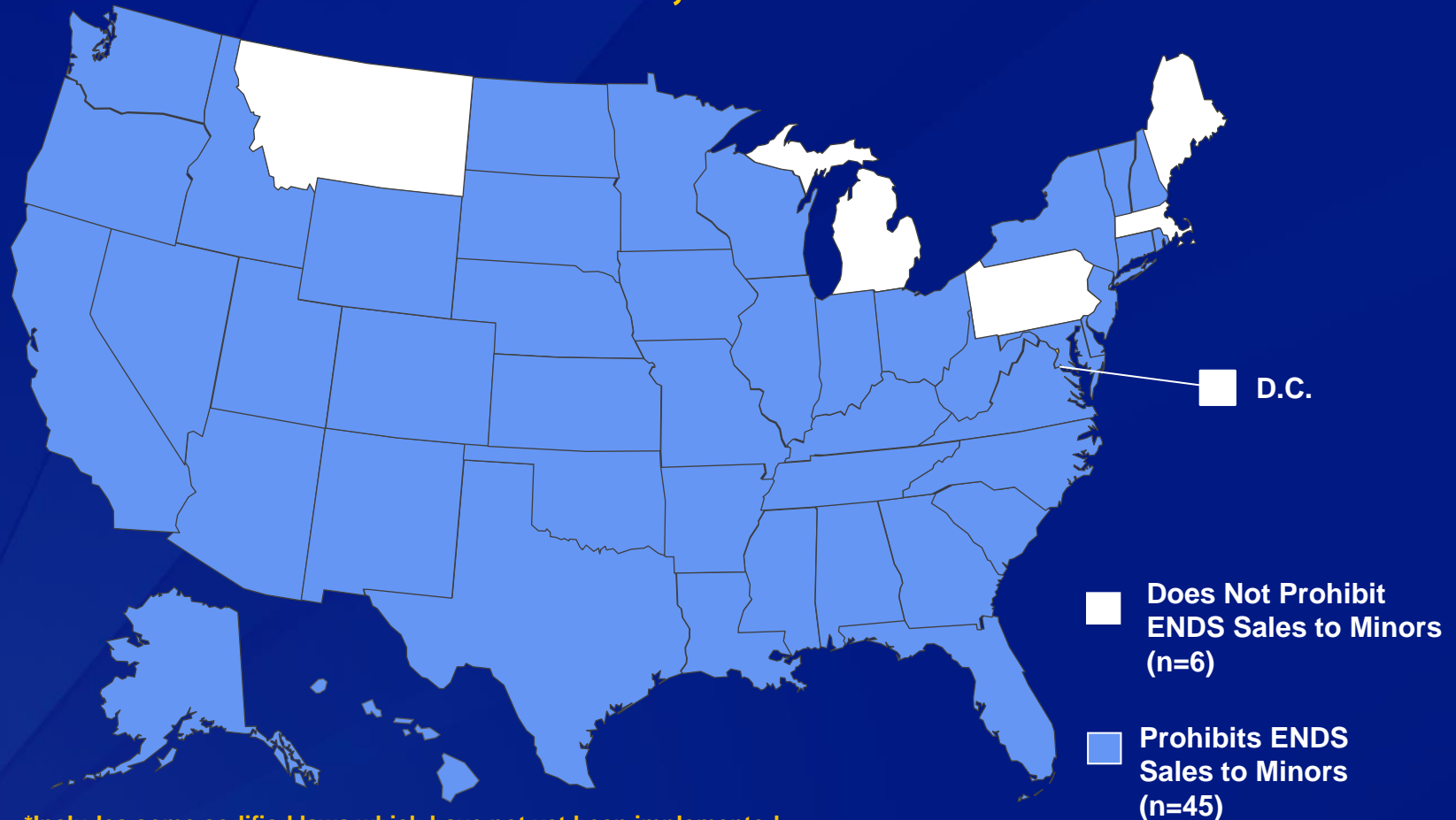
# Evidence-Based Interventions are Key





# States with\* and without laws prohibiting sales of electronic nicotine delivery systems (ENDS) to minors\*\*

## United States, October 2015



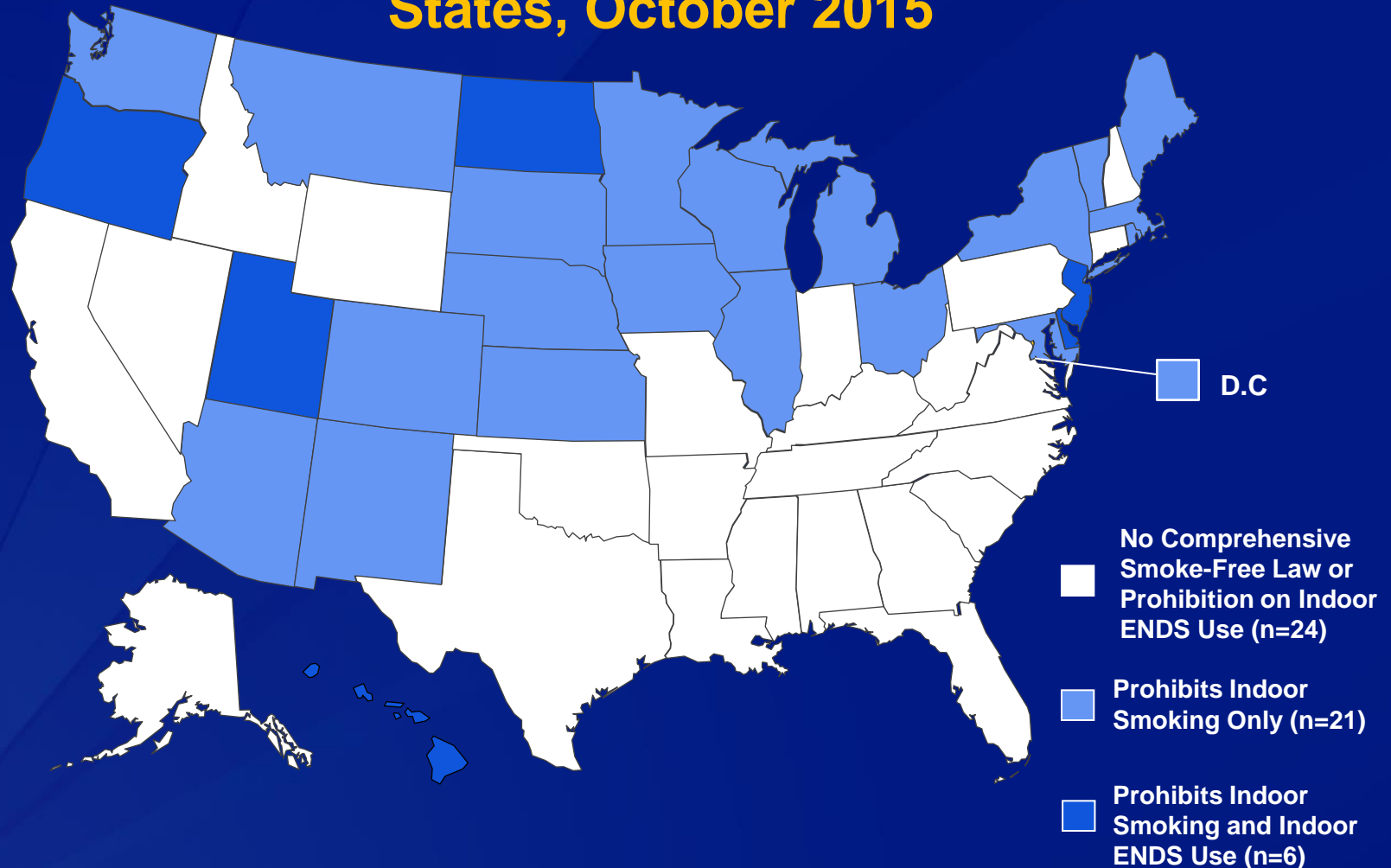
\*Includes some codified laws which have not yet been implemented.

\*\* Minors are defined by statute as persons <18 years, except in four states where they are defined as persons aged <19 years (Alabama, Alaska, New Jersey, and Utah) and one state where they are defined as persons aged <21 years (Hawaii).

# Evidence-Based Interventions are Key: Protect Clean Indoor Air Standards

- ENDS aerosol is not “harmless water vapor.”
- ENDS aerosol contains nicotine, as well as additional toxins, and is not as safe as clean air.
- Clean air—free of smoke and ENDS aerosol—protects the health of bystanders, prevents tobacco use initiation among youth, and encourages complete smoking cessation.

# States with and without laws prohibiting smoking and use of electronic nicotine delivery systems (ENDS) in indoor areas of private worksites, restaurants, and bars - United States, October 2015



# Recent CDC Research on ENDS

## ■ Escalating Youth Use Over Time:

- Notes from the Field: Electronic Cigarette Use Among Middle and High School Students—United States, 2011-2012 (*MMWR* 2014)
- Tobacco Use Among Middle and High School Students—United States, 2013 (*MMWR* 2013)
- Tobacco Use Among Middle and High School Students—United States, 2011-2014 (*MMWR* 2015)

## ■ Adult Trends in Awareness and Use:

- Trends in Awareness and Use of Electronic Cigarettes Among US Adults, 2010–2013. *Nicotine and Tobacco Research* 2014; 17(2):219-227.

## ■ Advertising and Flavors among Youth:

- Vital Signs: Exposure to Electronic Cigarette Advertising Among Middle School and High School Students — United States, 2014
- Tobacco Product Use Among Middle and High School Students — United States, 2014

# Recent CDC Research (Continued)

## ❑ **ENDS Use and Increased Intentions to Smoke:**

- Intentions to Smoke Cigarettes Among Never-Smoking U.S. Middle and High School Electronic Cigarette Users, National Youth Tobacco Survey, 2011-2013 (*Nicotine and Tobacco Research* 2013)

## ❑ **Illustrating the Harms of Nicotine:**

- Notes from the Field: Calls to Poison Control Centers for Exposure to Electronic Cigarettes—United States, September 2010-February 2014 (*MMWR* 2014)
- Nicotine and the Developing Human: A Neglected Element in the Electronic Cigarette Debate (*AJPM* 2015)

## ❑ **Highlighting what States have Done:**

- State Laws Prohibiting Sales to Minors and Indoor Use of Electronic Nicotine Delivery Systems — United States, November 2014 (*MMWR* 2014)

## ❑ **ENDS Fact Sheets**

- <http://www.cdc.gov/tobacco/stateandcommunity/index.htm>

# Key Take Away Points



## *Summary*

- ✓ ENDS are unregulated and are not an FDA-approved quit aid.
- ✓ Youth and adult ENDS use is increasing rapidly.
- ✓ Youth use of nicotine or tobacco in any form is dangerous.
- ✓ Adults must quit smoking cigarettes completely to realize potential benefits of ENDS.

## *Policy Approaches*

- ✓ No marketing or sales to kids
- ✓ Clean air is the standard
- ✓ FDA regulation is important, but states, localities, and tribes shouldn't wait to act
- ✓ Pedal to the metal on combustible tobacco



# Contact

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[www.cdc.gov/tobacco](http://www.cdc.gov/tobacco)



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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.